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ABSTRACT

The paper describes the implementation of a 3-year cognitive skills development curriculum, Instrucmental Enrichment (IE), at the North Carolina School for the Deaf in a question/answer format. The following questions are addressed: What are the goals? Who is it for? How is it taught? What is the IE classroom climate like? What is the theory? What are the deficient cognitive functions? What are some of the instruments and their specific areas of concentration? What is the proof? Where can I get information on purchasing IE materials? What kind of training is involved? What is a sample lesson like? In what ways does IE most benefit the teacher and students? (DB)

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"Debugging the Human Computer: Instrumental Enrichment"

By Mary Jo Johnson
North Carolina School for the Deaf

How would your work with hearing impaired students change if these students:

---regularly restrained their impulsive behavior?
---planned their work?
---knew how to follow a model?
---used correct labels in discussions?
---had high standards for preciseness in their completed work products?
---transferred classroom learning to new situations?

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There is a curriculum designed to achieve all of these. Instrumental Enrichment (IE) is a three year cognitive skills program. It is made up of fourteen separate instruments, or broad units of work. Each of these focuses on remediating particular cognitive deficiencies, and lessons within the unit are of graduated difficulty. Instruments are content free with the focus on teaching students how to problem solve.

Perhaps the best way to describe the Instrumental Enrichment program and how it is implemented at the North Carolina School for the Deaf is through a question/answer format. I'll pose questions I think you may have, answer these, and close by demonstrating a sample lesson.

First, what are the goals?

The overall goal is to teach students how to learn. This involves teaching them to learn from direct exposure to the environment, teaching skills and strategies for thinking, analyzing, and problem solving.

In addition, there are a number of subgoals:

1) remediating cognitive deficiencies
2) teaching concepts, operations, relationships

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3) building an intrinsic need system through habit formation; for example, the need to compare, to analyze, to check work
4) developing students' insights into their own thought processes
5) creating task intrinsic motivation (the joy of "licking" these tasks)
6) helping students perceive themselves as active generators of knowledge; developing a sense of competency

Who is it for?

IE was designed for use with low achieving 10 to 18 year olds. In our experience at NCSD, students who begin IE as seventh graders are most successful.

How is it taught?

IE is taught in fifty minute periods, three to five times a week. There is an introductory discussion of about ten minutes. Students work independently for approximately twenty minutes completing the tasks on the page. This is followed by ten minutes of discussion and development of insight. The teacher and students discuss solutions, and analyze difficulties. "What strategies did you use? Which tasks were most difficult? Why?" At this point, the teacher relates a particular principle chosen in connection with the task students have just completed. Examples of principles include: the importance of using a model, the benefits of developing and testing strategies and hypotheses, the need to be precise in our work, the advantages of perceiving and creating organization, the value of checking for errors. With one of these or some other carefully selected principle, the class then "bridges", applying the usefulness of the

principle to the areas of academic classes, vocational situations, everyday living, and interpersonal relationships. Students are led to come up with specific uses to extend skills beyond the immediate classroom. Class closes with a five minute summary.

What is the IE classroom climate like?

Cooperation, rather then competition, is encouraged. Students work on difficult and challenging tasks, but with the understanding that the teacher isn't going to let them fail.

What is the theory?

The ideas of Mediated Learning Experience (MLE) and remediation of cognitive deficiencies are central to the theory developed by the creator of IE, Reuven Feuerstein. According to Feuerstein, a learning experience is mediated when attention is focused in a certain way, and the event is interpreted meaningfully. In the grocery store, for example, a mother might point out to her child that there is a particular organization. They might discuss how things are grouped into categories -- frozen foods, fresh produce, dairy products, canned goods, -- based on similar attributes, and why.

What are the deficient cognitive functions?

Cognitive functions occur at the input, elaborative, and output levels of thinking. These are a number of possible problems at each level. For example, at the input level: unplanned, impulsive behavior; poor receptive verbal tools (lack of discriminatory labels for objects, events, and relationships); inability to process information from two or more sources simultaneously. At the elaborative level: lack of hypothetical thinking; difficulty in

distinguishing between relevant and non-relevant cues in definition of a problem; inadequate planning behavior. And at output level: using trial and error responses as a strategy; lack of correct labels for communicating an answer; impreciseness or inaccuracy in stating the solution to a problem.

What are some of the instruments and their specific areas of concentration?

Organization of Dots
- defining the problem
- planning
- using models
- checking for errors

Orientation in Space
- understanding a simple system (front, back, right, left)
- determining and working from a point of reference

Comparison
- recognizing similarities and differences
- dealing with several sources of information simultaneously
- building the habit of spontaneous comparison

Analytic Perception
- using a systematic search
- discriminating parts
- synthesizing parts into a whole

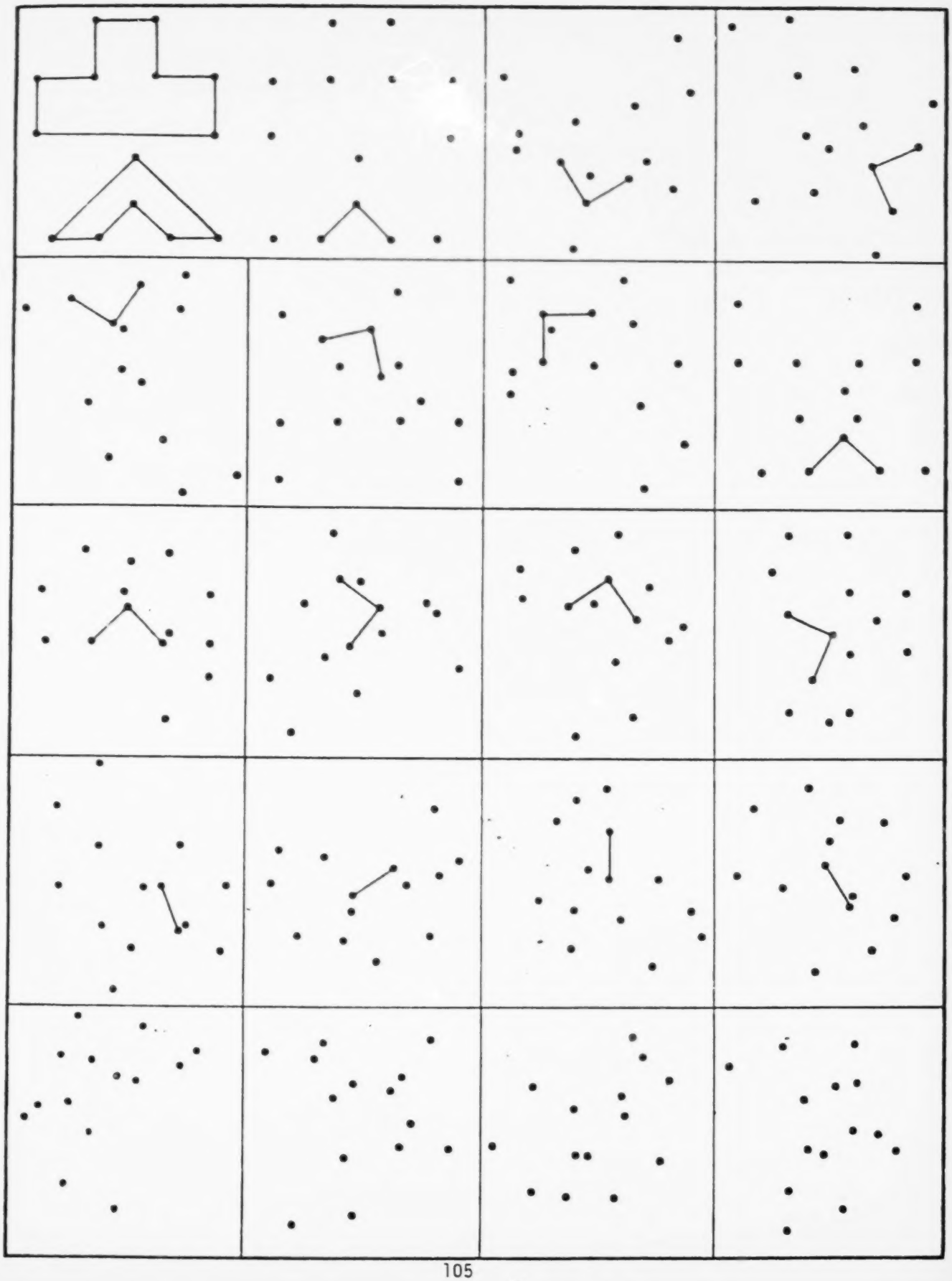
These four are the basic first year instruments. The emphasis is on data gathering and practice of good thinking habits. Second year instruments further develop these thinking skills and also focus on relationships in systems. In the third year, students learn to use these relationships to create knowledge; Syllogisms, dealing with formal logic, is a good example of this.

What is the proof?

Progress in IE occurs in three stages. First, mastery of the instruments themselves. Second, improved scores on tests of scholastic aptitude. And finally, generalized improvement in thinking and learning processes as reflected by gains in content areas such as social studies, science, language arts. Deaf students' success at the first two stages has been documented by research at NCSD (Haywood, Towery-Woolsey, Arbitman-Smith, Aldridge, 1988). The third stage ws not demonstrated in this study; improvement in learning content area material follows improvement in the thinking/ learning process, as students begin to apply their new thinking behaviors. However, there is anecdotal evidence from teachers that points to increasingly successful learning processes in IE students. These students have been described as "exceptionally teachable." They take notes without prompting and organize these notes. They use the dictionary spontaneously. They engage in lively classroom discussions, pushing fellow students to be specific and give proofs for their answers. Teachers recently asked that the IE students be kept in intact classes because they had developed an unusual group cohesiveness.

The previous observations were made by teachers in the junior and senior high departments at NCSD. I've seen the same benefits; in addition, in my writing classes, I've found that students pay attention to my comments on their essays and act on my suggestions. Again, proof that they see themselves as active learners.

One final story to illustrate: when the Homecoming Committee sponsored a door decorating contest in the high school, I told my IE students I would provide them with the time and materials they needed. Otherwise they were on their own. They chose a leader and organized themselves into committees. A part of their display was the American



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flag; these students even dispatched several of their group to the library to do research. (In what color order do the stripes appear? How exactly are the stars arranged?) I was impressed by the thoroughness of their planning, their careful division of tasks, and the precision with which they executed the whole project. I was proud of their independence. I wasn't surprised when they won!

Where can I get information on purchasing IE materials?

Write to:

Dr. Michael Begab (consulting editor for IE)
Lifelong Learning Division
Scott Foresman
418 East Franklin Avenue
Silver Spring, Maryland 20901

What kind of training is involved?

Training for IE teachers is extensive. Materials are sold only to systems with trained and certified teachers. An initial week-long workshop at the beginning of the school year provides the basics. After this, teachers begin using the first instruments with their students. There is also a three-day workshop in November and another in February. The same cycle of workshops is repeated during the second and third years. Teachers learn the instruments and deepen their understanding of the program's philosophy, theory, goals, and methods.

What is a sample lesson like?

I'll use Organization of Dots, page 5, (copyright @1978 by Professor Reuven Feuerstein, Hadassah-Wizo-Canada-Reseach Institute), to illustrate.

Insert Organization of Dots, page 5, here

First I ask the students to look over the page to determine their task. Having worked the previous pages in this instrument, they understand that they will be following the model given in the first frame and finding identical figures in the scheme of dots in each succeeding frame. The task will become progressively more difficult as the dots become closer together, resulting in overlapping figures.

We determine labels for the figures. I point out that these have no universal labels, so we come up with our own idiosyncratic labels; the class determines these--perhaps hat and tent for this particular page. Our purpose in labeling is to have a mental picture to follow as we seek the figures in each configuration of dots. We analyze each figure, counting dots and noting salient features, i.e., the square at the top of the hat, its unusually long base line, the four dots in a row at the base of the tent.

As our discussion continues, I ask students how they will begin. What is the best starting point? Obviously, the two lines given in the first three rows. We call these cues and as we scan the page, we see that these are fading cues. In the fourth row, there is only one line given and in the fifth row, we're on our own. (This is a possible principle for this page: Sometimes I begin work with a cue or help that is gradually taken away as I become more

skilled and independent. We might also talk about the need for a backup plan in case the first strategy doesn't work.)

At this point, we've talked enough. Students begin their independent work and I circulate among them observing their work processes and guiding those who need help. The word "guiding" is important. I don't give answers or do the work for them. I ask questions and make suggestions: "What strategies have you tried? What else might you look for? Think about the special characteristics of each figure."

Students who complete their work early use the extra time to recheck. They think of possible bridging examples for our discussion on applying the principle, and sometimes they informally help their classmates.

After independent work, I begin discussion by asking students to explain how they worked, talk about any problem areas they had, and share new strategies they devised. I restate the principle I've chosen for this page and ask students for appropriate examples . "Often, in beginning new tasks, we're given a cue to help us. The cue is gradually removed as we become more proficient. What examples can you think of to help us apply what we've learned in other academic, vocational, interpersonal, or everyday living areas?" Students may mention such things as the dotted lines on their first grade notebook paper to guide beginners in making letters the correct height, or the training wheels that were removed from their first bikes as they learned to balance.

We close with a summary. I remind students of the processes they've used to complete their work and how these will be valuable habits. For example, "You planned carefully. First, you gathered necessary data by analyzing the model and making mental pictures. You determined a starting point and worked from a cue. When the cue disappeared, you devised a substitute. You worked neatly

and then checked your work by comparing it with the model. If there were differences in size or shape, you looked for the source of the error and corrected it. Although the task became more difficult, you were successful because you made a plan and followed it. You can use these work habits when you do homework, study for a test, fix your car, or bake a cake. They will be important in any job you have." Class dismissed!

Finally, in what ways does IE most benefit you and your students?

For the teacher, it offers the excitement of learning something new, the chance to expand and refine personal thinking processes, the ability to cover other subject matter more successfully, and the adventure of seeing a new kind of student growth.

Students benefit by becoming active, independent learners. They develop the ability to plan and troubleshoot before they begin to work. They choose from a variety of problem solving strategies, and they check and evaluate their work.

IE has changed me significantly as a learner and as a teacher. And I'm excited by the growth I see in my students!

Other questions?

Contact me at:

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